

Ultrasound Journal

# An example of the use of multiparametric ultrasound in the diagnosis of prostate disease

Case 8



A special thanks for sharing this case to PhD Dr. Hasanov Marat Zufarovich of the Ultrasound Department of the Republican Clinical Oncological Dispensary of the Ministry of Health of the Republic of Tatarstan named after Professor M.Z.Segal.

## Key Points

- TRUS imaging grayscale and Color Doppler findings can be nonspecific for malignancy
- Advanced ultrasound applications available on the Resona 7 provide additional diagnostic information in prostate imaging

## 1 - Case Description

A 66 years old male presented to the ultrasound department with complaints of severe pain in the lumbar spine (according to the VASH 5 scale). His PSA level was 6.9 ng/ml, and on manual examination, the prostate gland was elastic, without nodular pathology.



## 2 - Ultrasound Examination

A transrectal ultrasound examination (TRUS) was performed on the Resona 7 ultrasound machine (Mindray, China). The volume of the prostate gland measured 36 ml, and a hypoechoic lesion of indistinct, uneven contour with a maximum diameter of 15 mm was seen in the peripheral zone of the right lobe, near the interlobular furrow (Fig. 1).

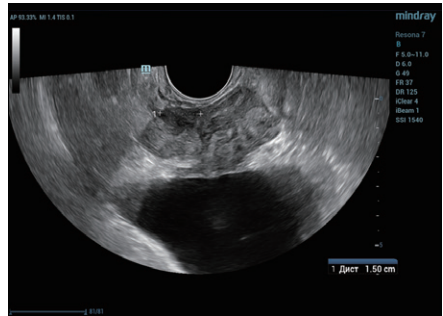


Figure 1 – B-mode TRUS image showing a hypoechoic lesion in the right peripheral zone.

In power Doppler mode, an asymmetric increase in vascularity was seen within the hypoechoic lesion noted on B-mode TRUS imaging (Fig. 2).

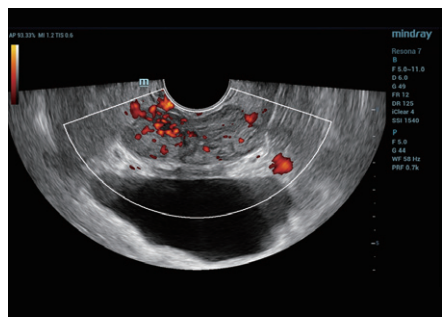


Figure 2 – Power Doppler imaging showing asymmetric hypervascularity in the prostate

## Strain Elastography Findings

Using Natural Touch Elastography on the Resona 7 the stiffness of the prostate gland

was assessed. The hypoechoic lesion within the peripheral zone did not show as significantly stiffer than the surrounding tissue with a Strain Ratio measuring between 0.56-0.87.

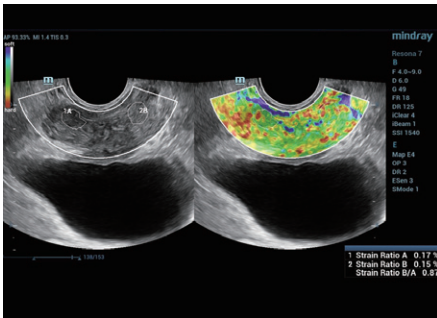
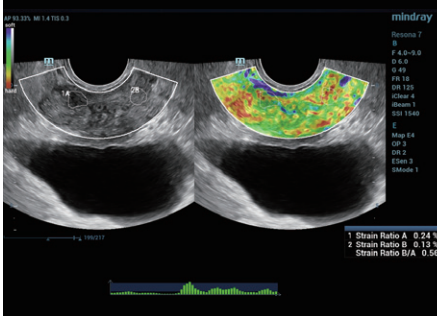


Figure 3 – Strain Ratios of the hypoechoic lesion

**Contrast Enhanced Ultrasound Findings**

For contrast enhanced ultrasound (CEUS), the area of interest was visualized immediately after injection of 2.4 ml of Sonovue (Bracco Swiss, SA, Switzerland) for 3 minutes in contrast mode. The hypoechoic lesion in the peripheral zone was shown to have hyperintensive contrast enhancement of relatively unchanged parenchyma, with rapid influx and outflow of contrast medium (Fig. 4).

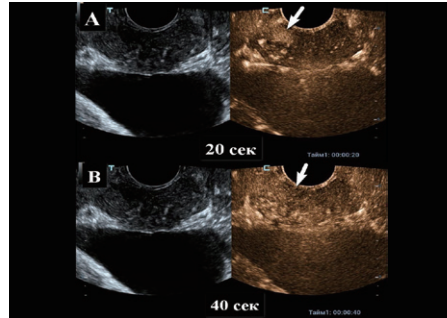


Figure 4 – CEUS imaging of the prostate at 20 seconds and 40 seconds post injection

The time–intensity curve of the focal lesion was characterized by a rapid rise and subsequent rapid fall. The main quantitative indicators were TTP 16.5 sec, PI 35.7 dB, DT/2 78.6 sec, AUC 4634.2 dB/sec. For the intact peripheral zone, the time–intensity curve was characterized by a smooth rise and subsequent plateau phase, TTP was 63.9 seconds, PI 27.5 dB, AUC 4429.2 dB/sec. The DT/2 parameter was not determined (Fig. 5).

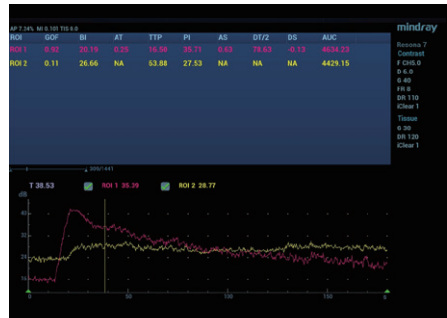


Figure 5 – Contrast Imaging Quantification Analysis, time–intensity curve construction mode. The red curve represents the focal lesion and the yellow curve an intact section of the peripheral zone.

**Biopsy result**

A systematic transrectal biopsy of the

prostate gland was performed under ultrasound guidance with targeted sampling of 12 points.

Histological examination: in a column of tissue from the area of interest, the growth of acinar adenocarcinoma is 7 points according to Gleason (3 + 4). Histological result of focal formation of the peripheral zone on the right, acinar adenocarcinoma is represented by light tumor acinuses that do not have a basal cell layer. (Fig. 6).

### 3 - Diagnosis

#### Malignant neoplasm of the prostate gland, T2csN0M0.

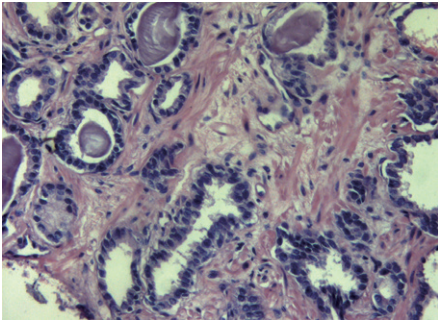


Figure 6 – Micro-preparation of histological sample at the focal lesion seen on ultrasound.

### 4 - Discussion

Classical ultrasound signs of prostate cancer are considered to be hypoechoic, hypervascular formation in the peripheral zone with a fuzzy contour<sup>[1]</sup>. These signs are characterized by low specificity, since similar changes can occur with various benign changes<sup>[2]</sup>. In this regard, multiparametric ultrasound is necessary to provide additional diagnostic information. Strain elastography can provide a map of the tissue stiffness in a given region of interest. While malignant lesions tend to be stiffer than normal tissue, this is not always so, as seen in this particular case where strain ratios did not indicate significant change in stiffness between the focal lesion and the surrounding intact tissue. CEUS can provide more detail regarding tissue vascularity. In this case, CEUS examination confirmed pathological vascularization within the focal lesion seen on B mode imaging, not just by qualitative signs, but also by quantitative parameters.

#### References:

1. Ellis, W. J., Chetner, M. P., Preston, S. D. & Brawer, M. K., 1994. Diagnosis of Prostatic Carcinoma: The Yield of Serum Prostate Specific Antigen, Digital Rectal Examination and Transrectal Ultrasonography. *The Journal of Urology*, 152(5, part 1), pp. 1520-1525.
2. Postera, A., Mischi, M., Rosette, J. d. I. & Wijkstra, H., 2015. Multiparametric ultrasound in the detection of prostate cancer: a systematic review. *World Journal of Urology*, 33(11), pp. 1651-1659.

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